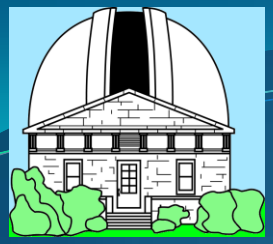
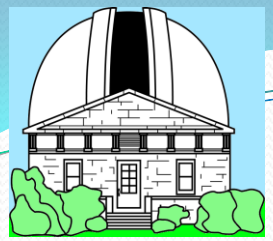


Possible Targets for Automated Speckle Observing:

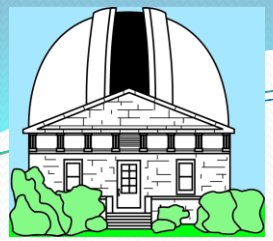
Optimized Observing



Optimizing

A few questions addressed in random order…

1. ***How often should a pair be measured per published mean measure?***
2. ***How do we pick the best cadence for observing doubles?***
3. ***Do we even need to worry about cadence in era of robotic speckle observations?***



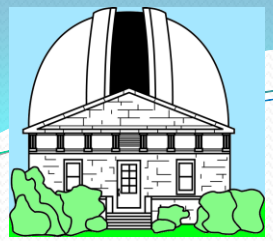
Determining N

How often should a pair be measured per published mean measure?

Micrometry observers usually averaged multiple measures into a given mean before publishing (typically N~3).

Speckle observers usually do not (observing efficiency).

Should we? (probably yes)

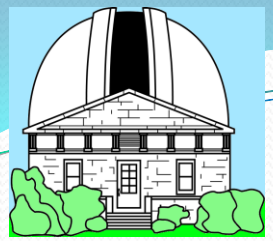


Determining N

How often should a pair be measured per published mean measure?

Factors may include:

- Separation (relative to telescope aperture)
- Magnitude
- Magnitude difference
- Seeing and transparency



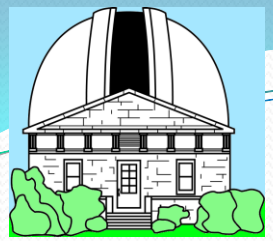
Determining N

How often should a pair be measured per published mean measure?

Multiple observations on given night versus multiple nights? (micrometry observers did both)

Automated/robotic operation should give us time to make extensive tests (multiple dimensions = time consuming!)

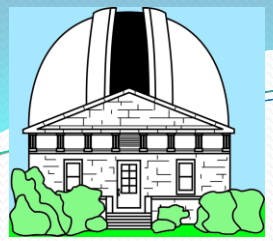
Have any robotic operations done this?



Optimizing

Do we even need to worry about cadence in era of robotic speckle observations?

If observing program is dedicated to following up motions of orbit pairs and candidates, maybe not!



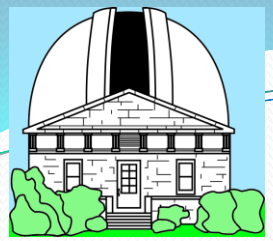
Optimizing

Do we even need to worry about cadence in era of robotic speckle observations?

6th Orbit Catalog includes elements for 2,392 pairs.
Of these, 1757 have appropriate separations for speckle (4m / 2m / 26in = 1159 / 1334 / 889).

Add potential orbit pairs – double these numbers?

Dedicated telescope could observe all accessible orbit pairs multiple times per year (even if N~3).



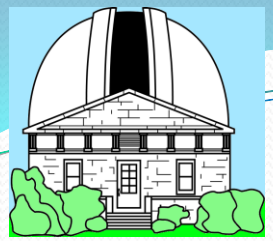
Optimizing

Do we even need to worry about cadence in era of robotic speckle observations?

Upside: Extensive observations may result in many improved orbits.

Downside: Overkill for many pairs. May waste time better spent in survey work, followup of neglected doubles, etc.

(as well as observing millions of new MoM & Gaia pairs…)



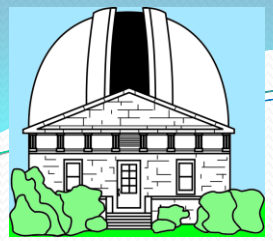
Finding the Best Cadence

How do we pick the best cadence for observing doubles?

Non-orbit pairs: based on separation (wider → longer period → less frequent observations)

(shall we say seat of the pants?)

Orbit pairs: depends on orbital period, eccentricity, and existing phase coverage

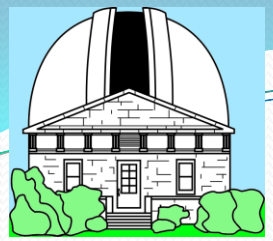


Finding the Best Cadence

"Phase Optimizer" **– BFI* attempt to pick optimal times to observe a given orbit pair**

Based on minimizing orbit grade (1-5 scale, based on Nobs, phase coverage, weighted O-C residuals, number of revolutions, max gaps in phase and theta)

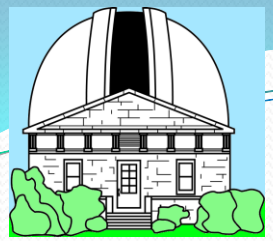
(* brute force and ignorance)



"Phase Optimizer"

Procedure:

- Add N new measures (ρ and θ derived from existing elements, with small random errors then added)
- New measures placed at large number of locations along orbit (over defined span of time)
- New grade determined for each distribution of measures
- Distribution determined which yields minimum grade

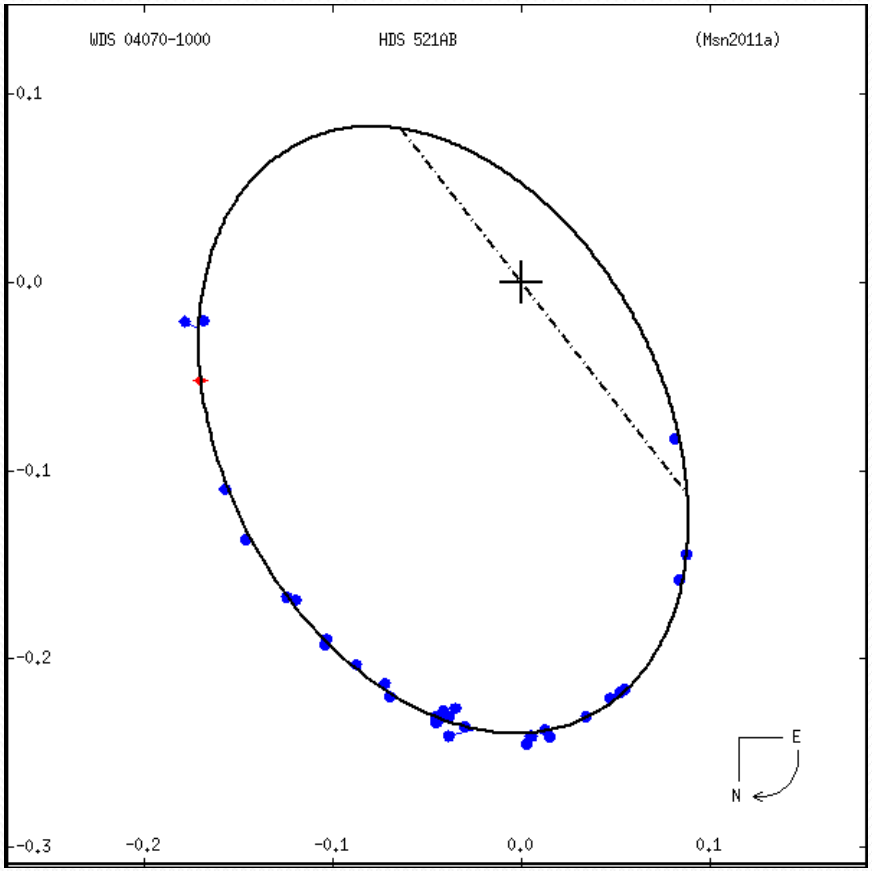


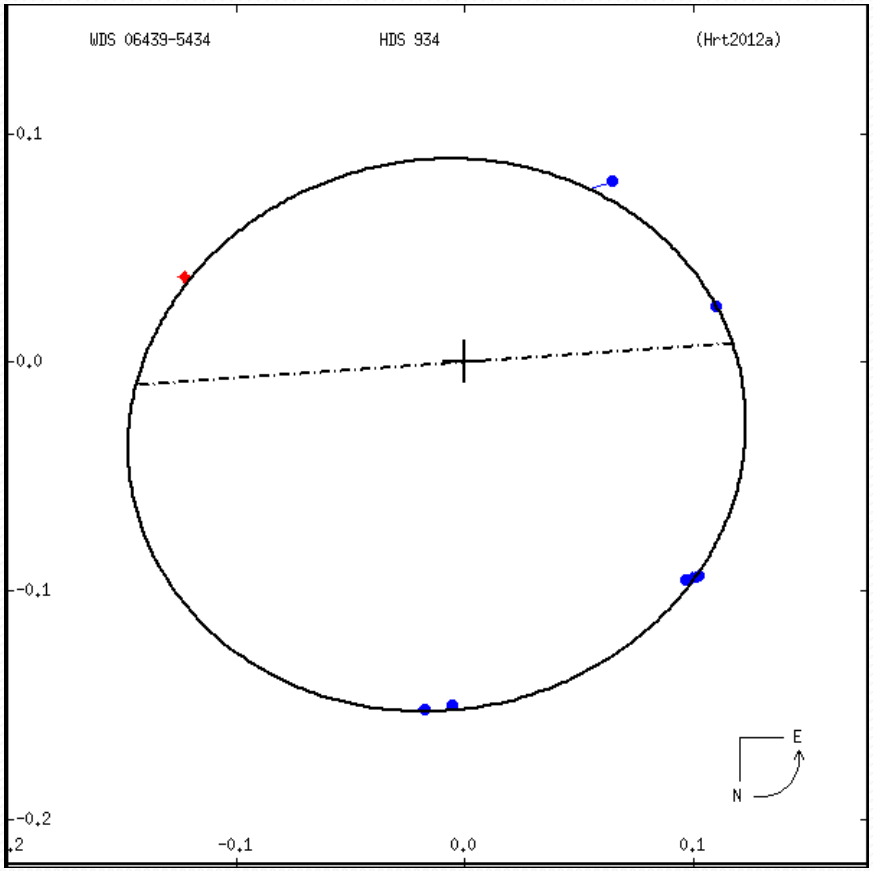
“Phase Optimizer”

Examples:

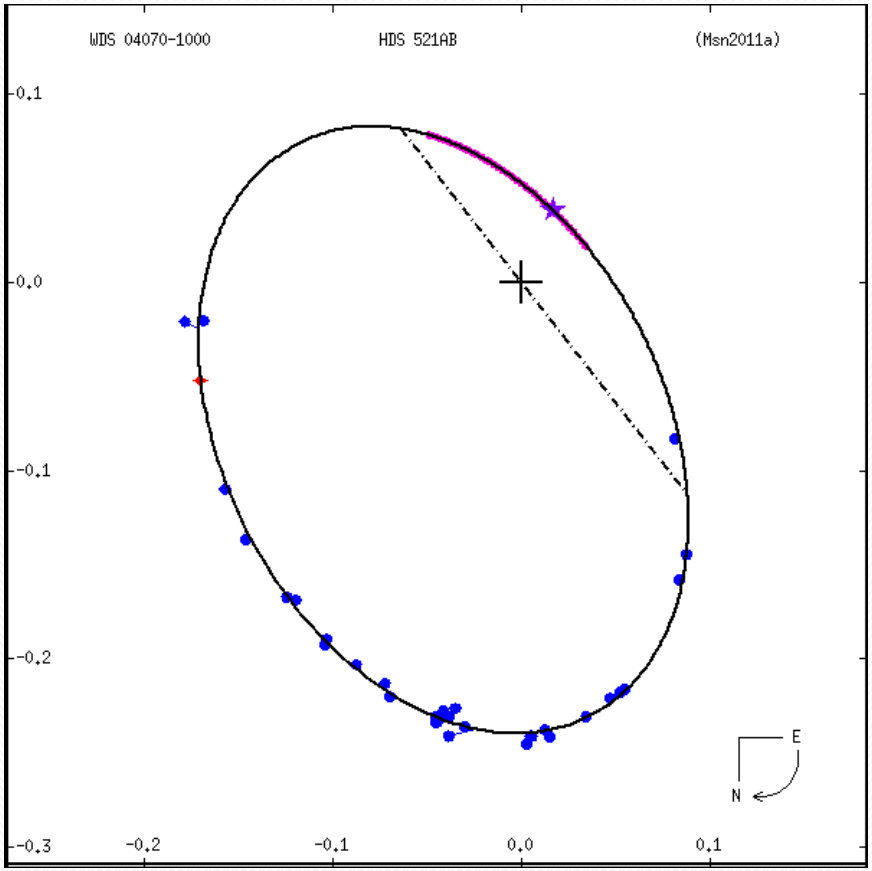
- Add up to 5 new measures over date range 2014 to 2014 + period (minimum range 5 years, maximum 20 years).

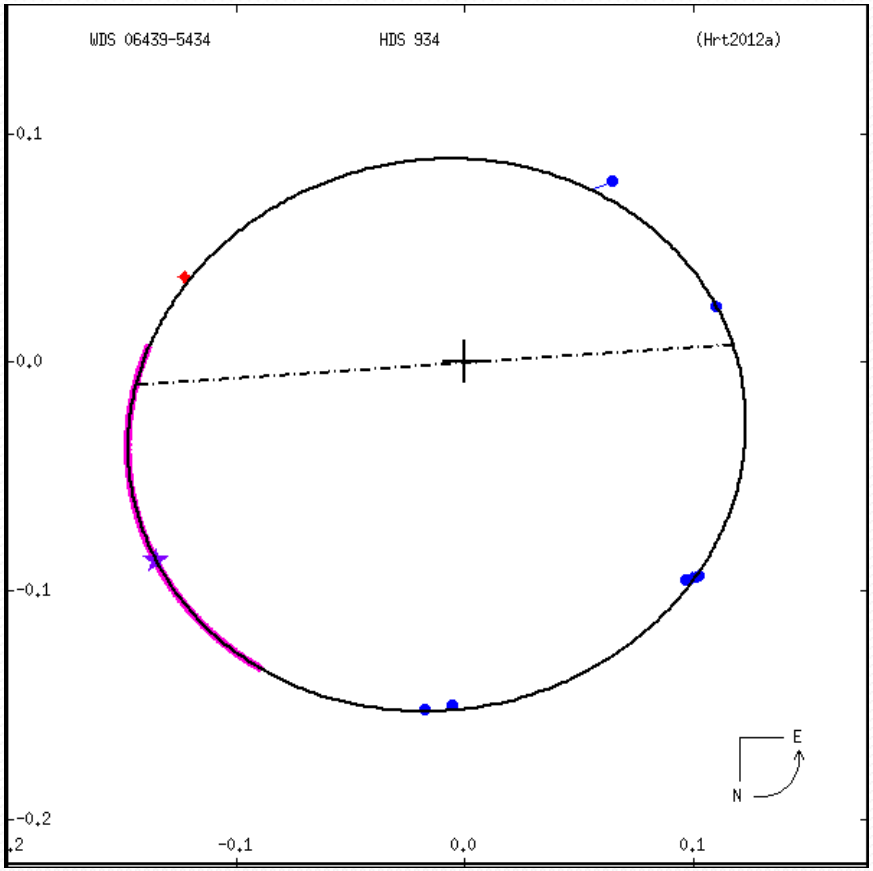
HDS 521 (21.6y) HDS 934 (12.4y)



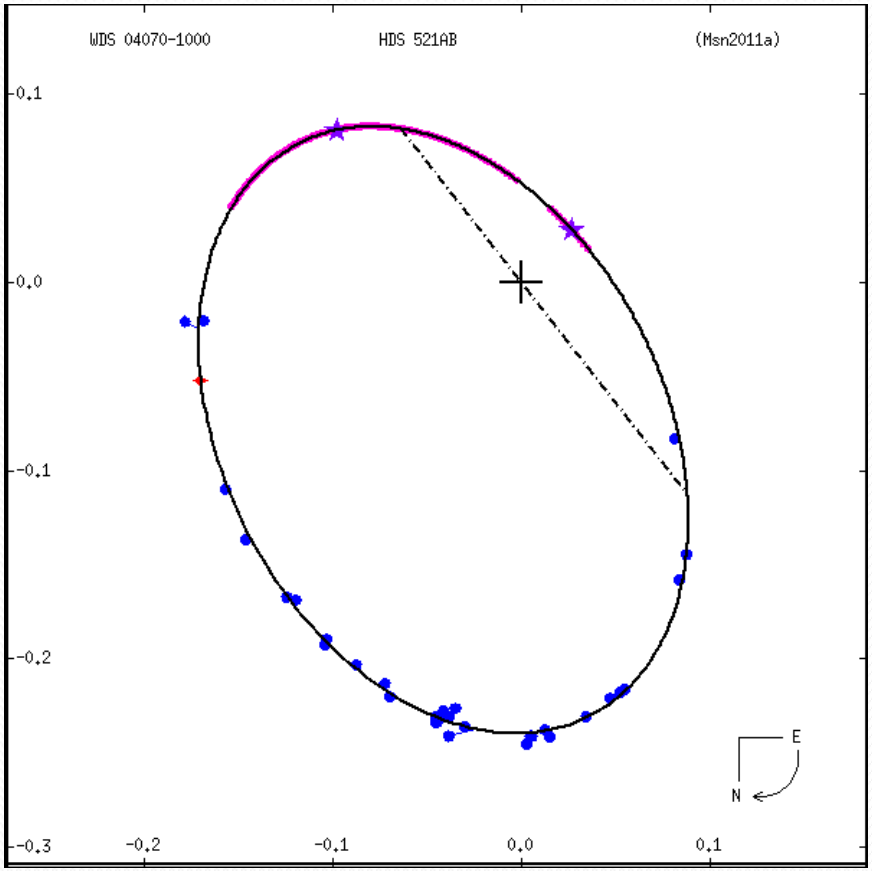


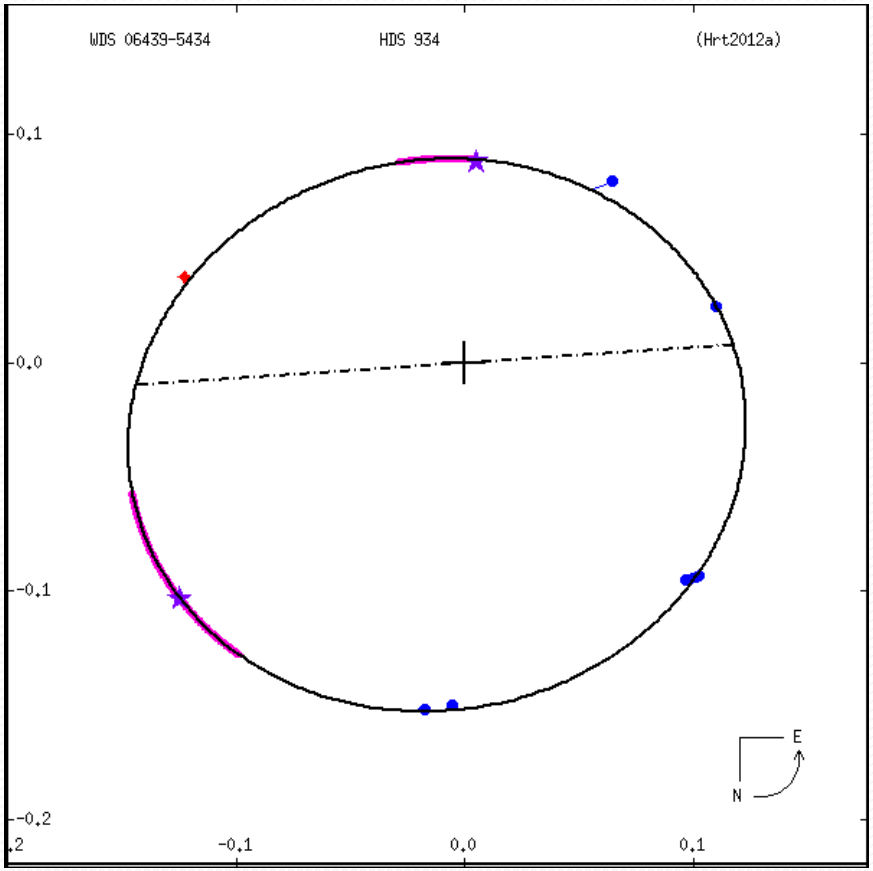
HDS 521 (21.6y) HDS 934 (12.4y)



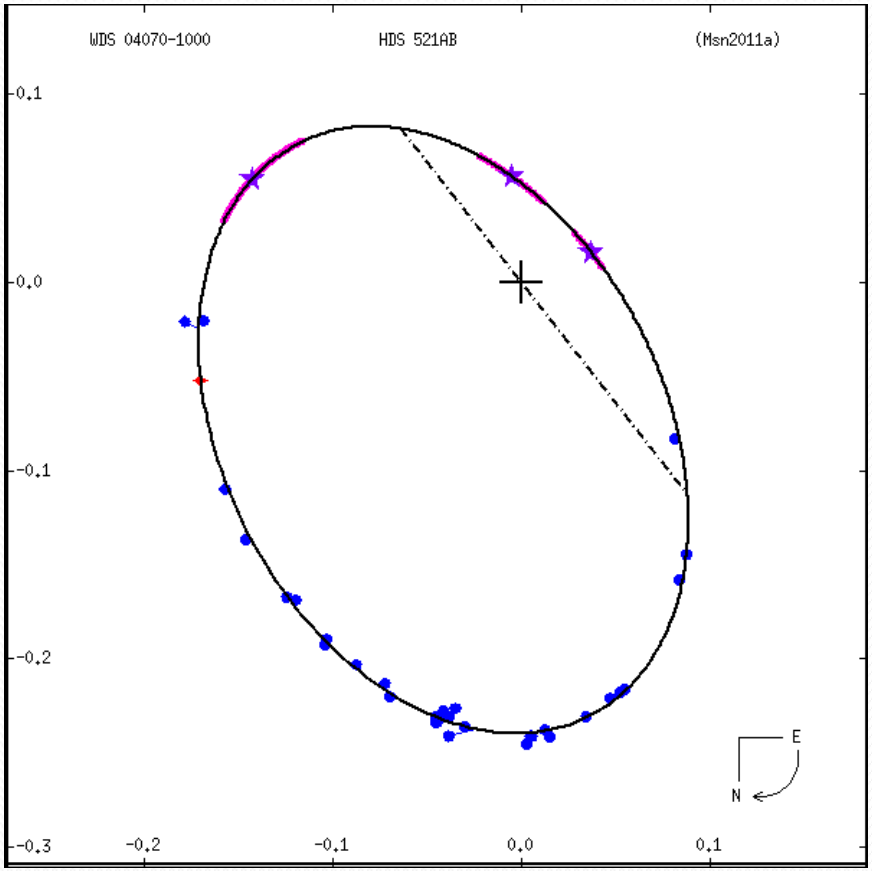


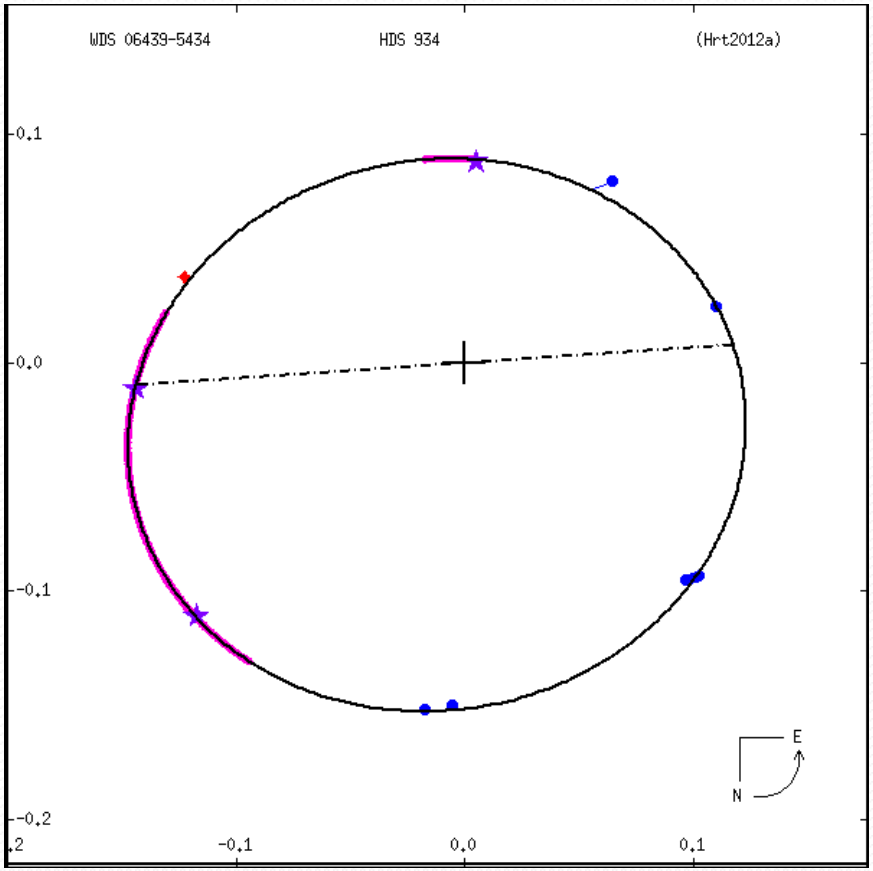
HDS 521 (21.6y) HDS 934 (12.4y)



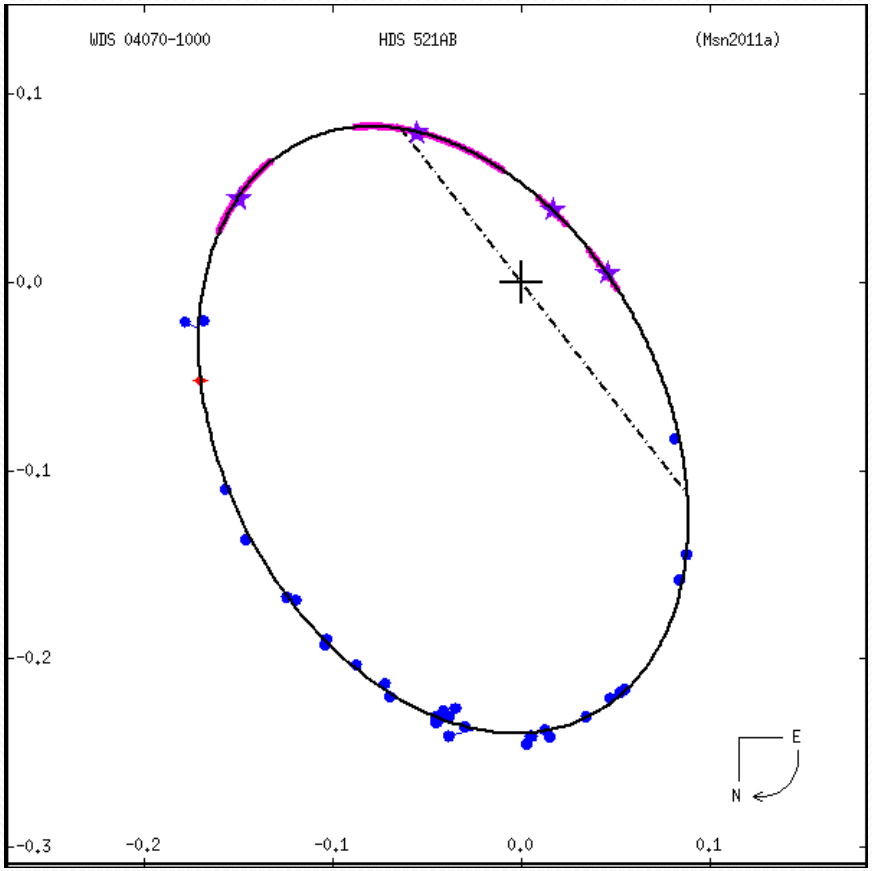


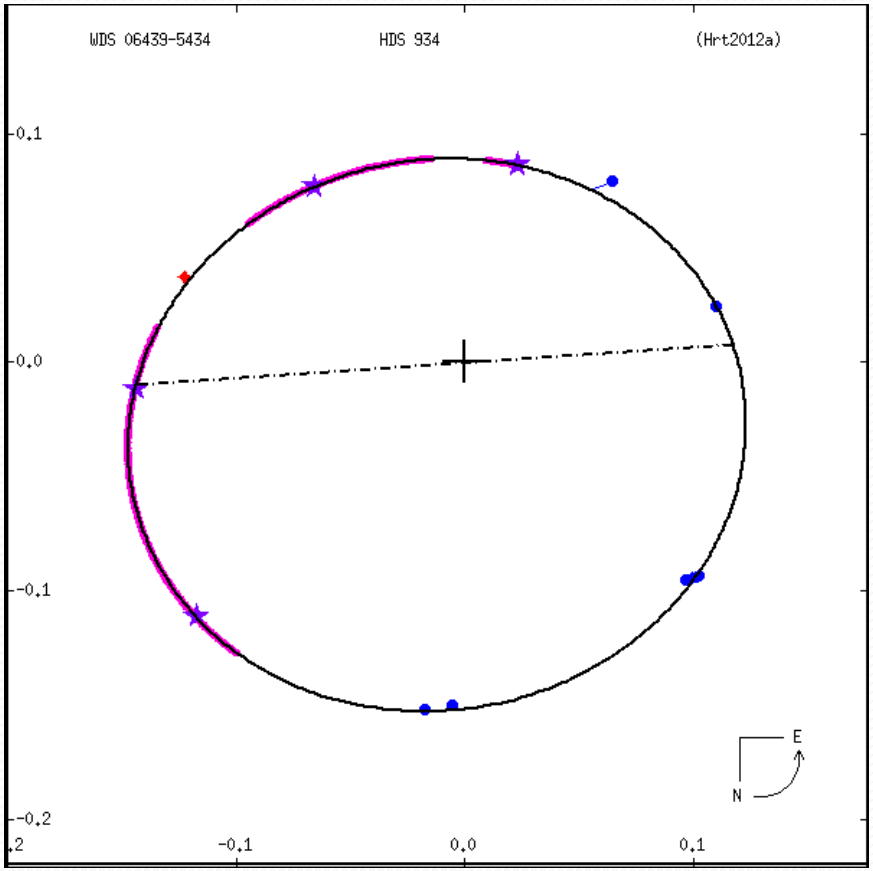
HDS 521 (21.6y) HDS 934 (12.4y)



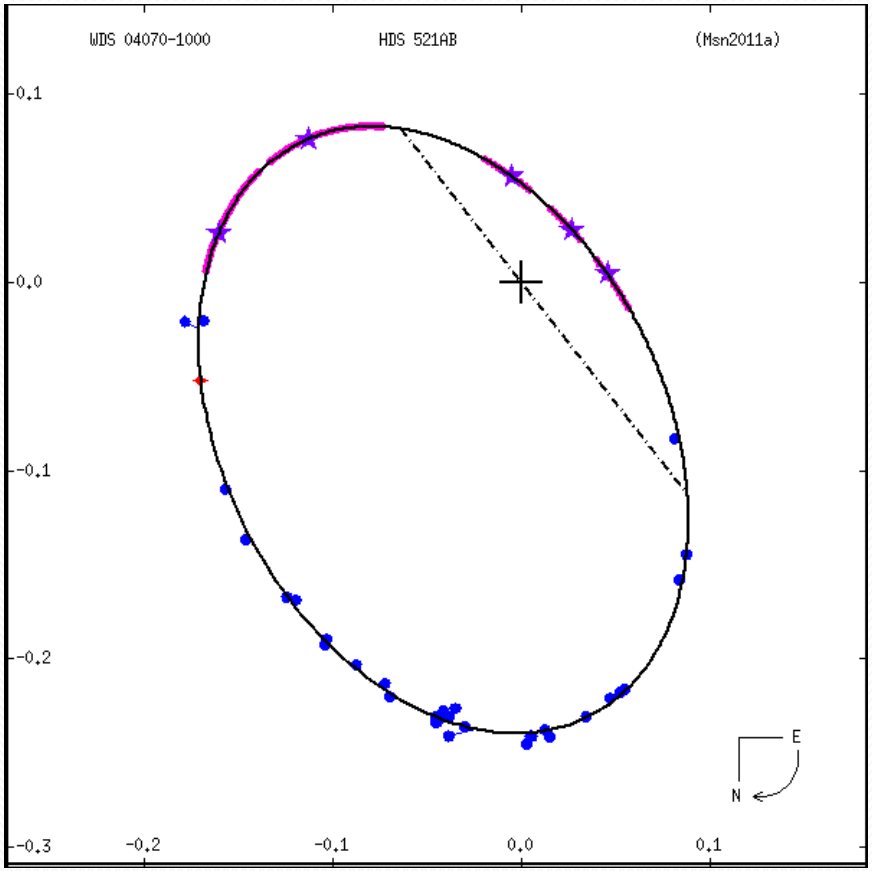


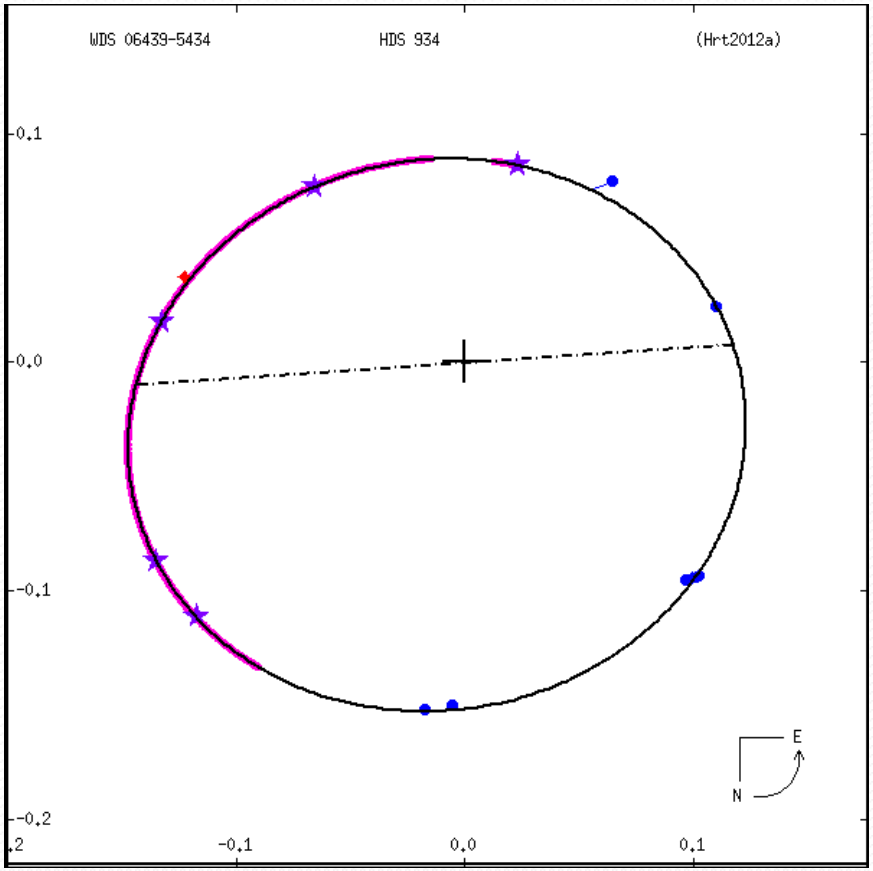
HDS 521 (21.6y) HDS 934 (12.4y)



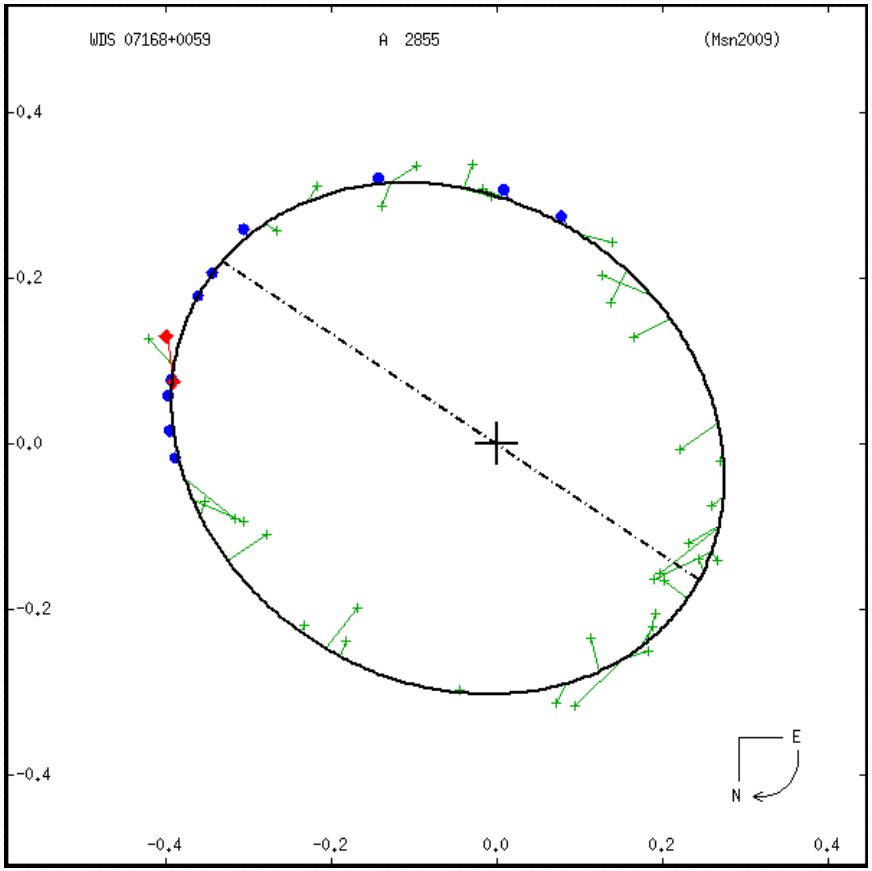


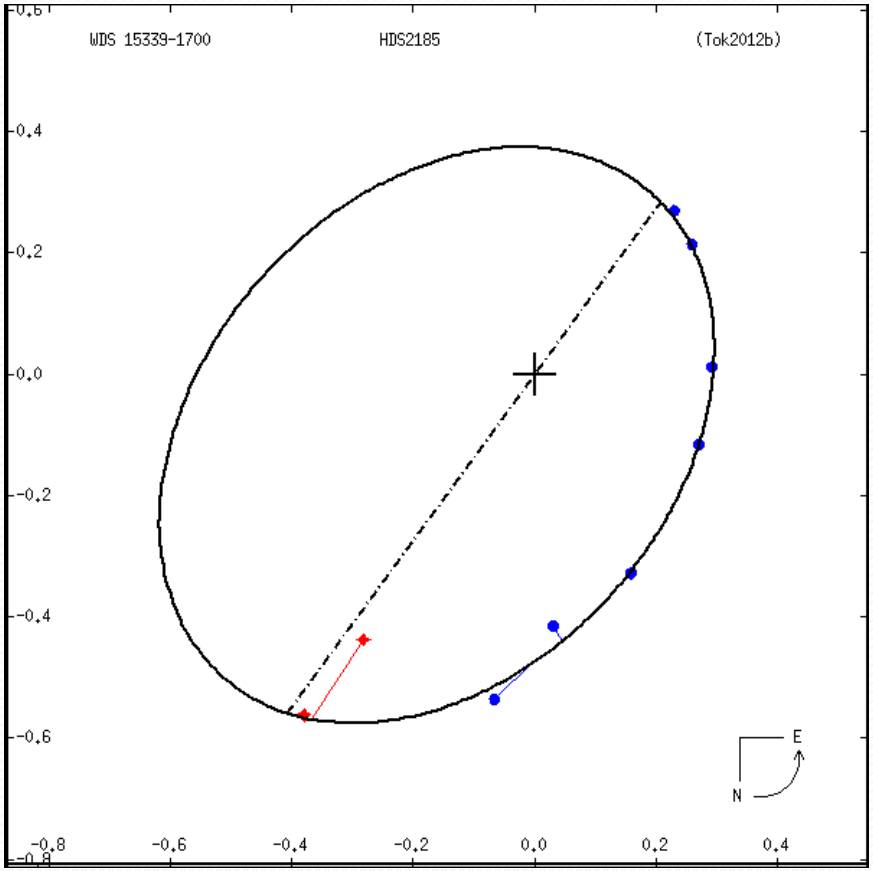
HDS 521 (21.6y) HDS 934 (12.4y)



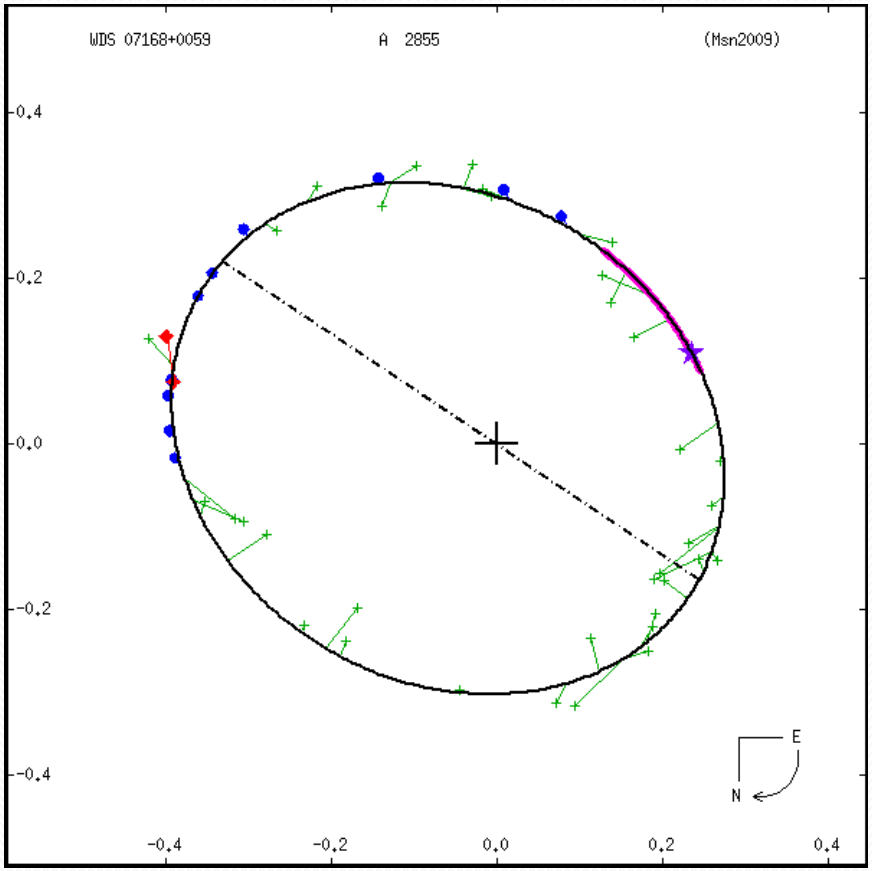


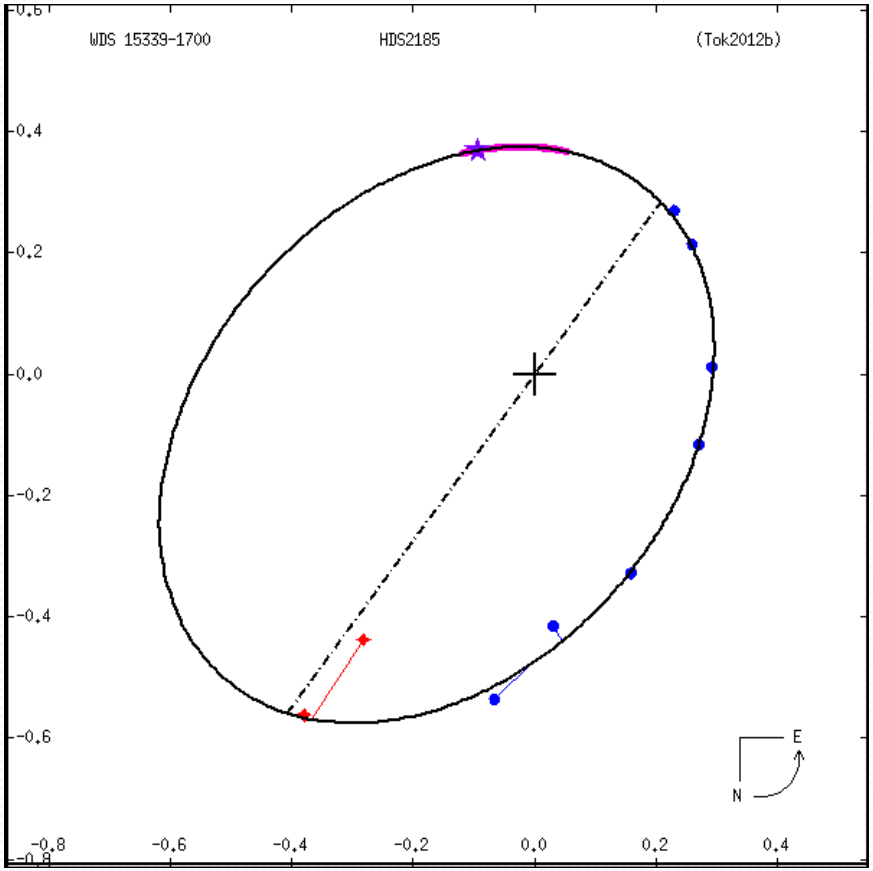
A 2855 (64.4y) HDS 2185 (60.0y)



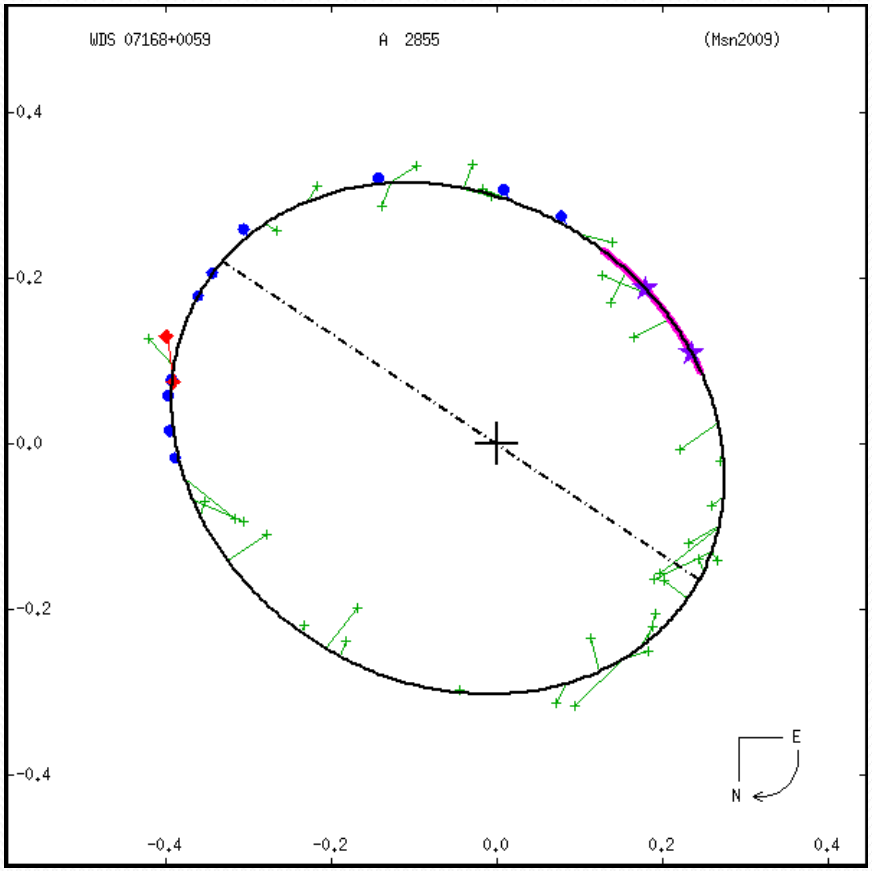


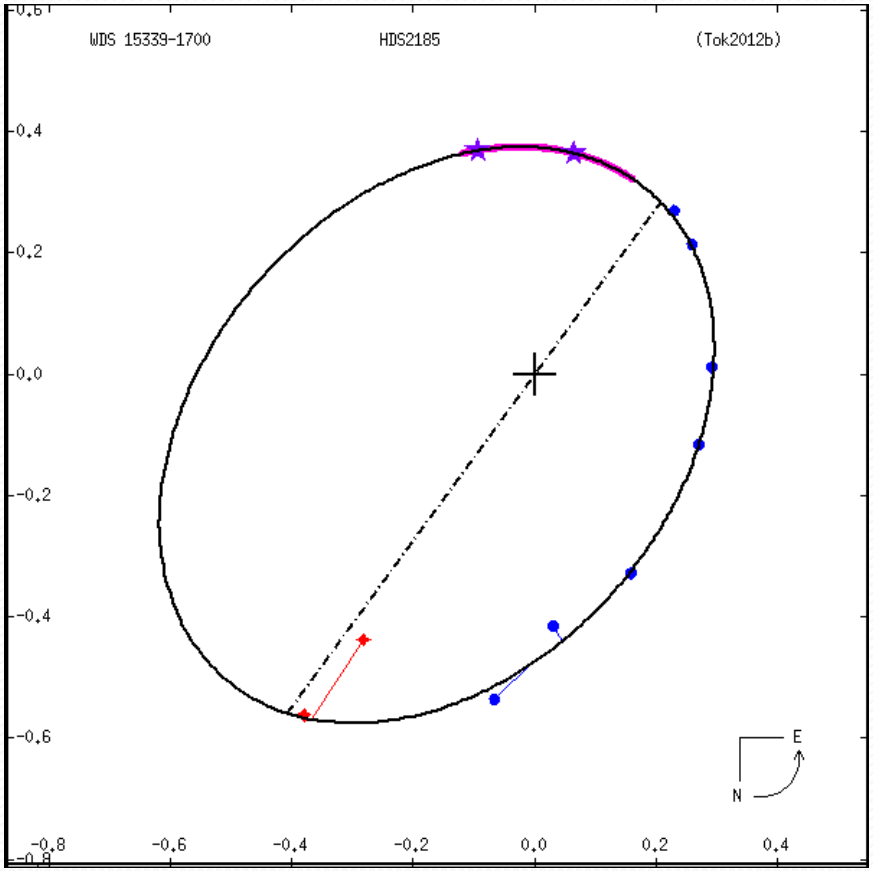
A 2855 (64.4y) HDS 2185 (60.0y)



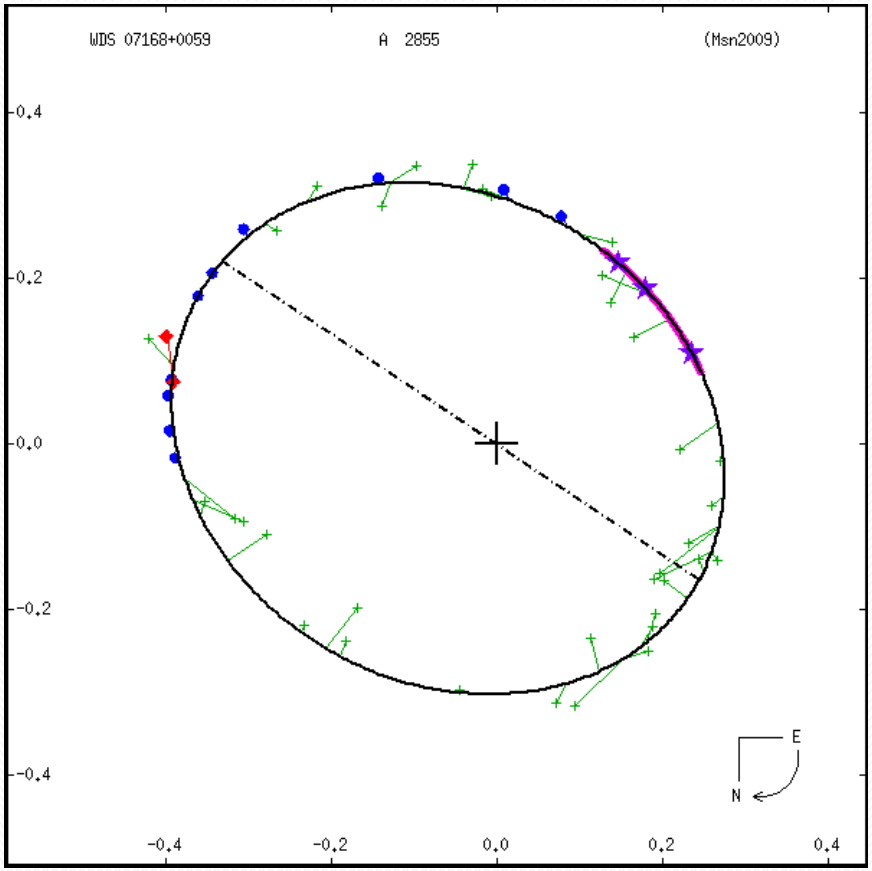


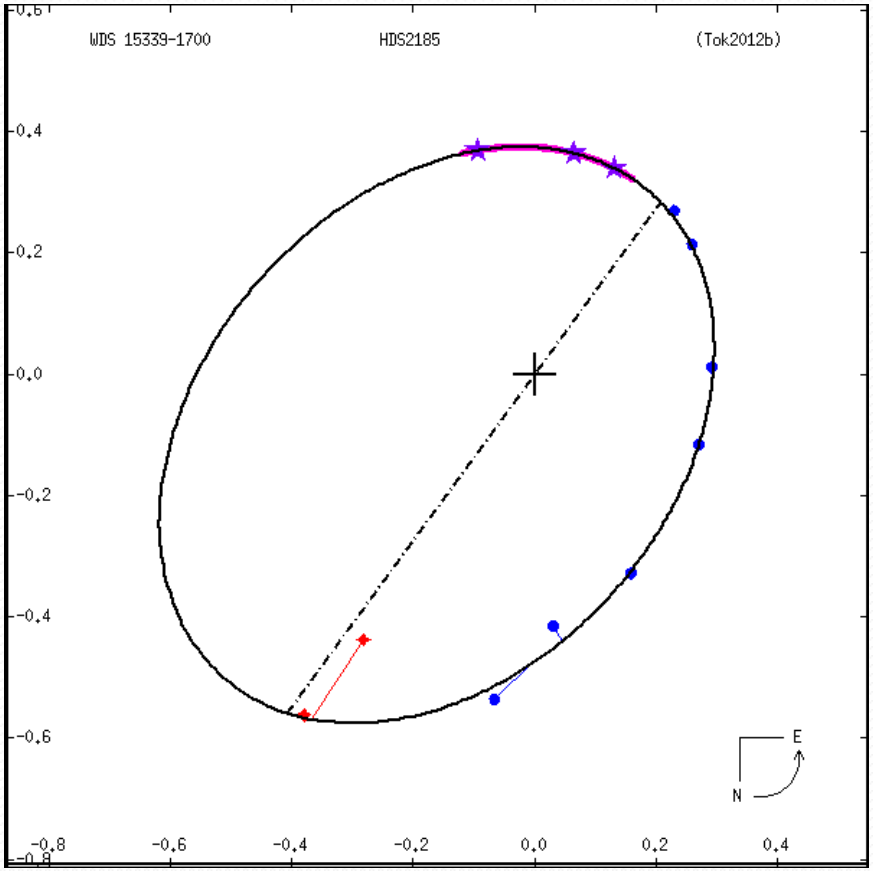
A 2855 (64.4y) HDS 2185 (60.0y)



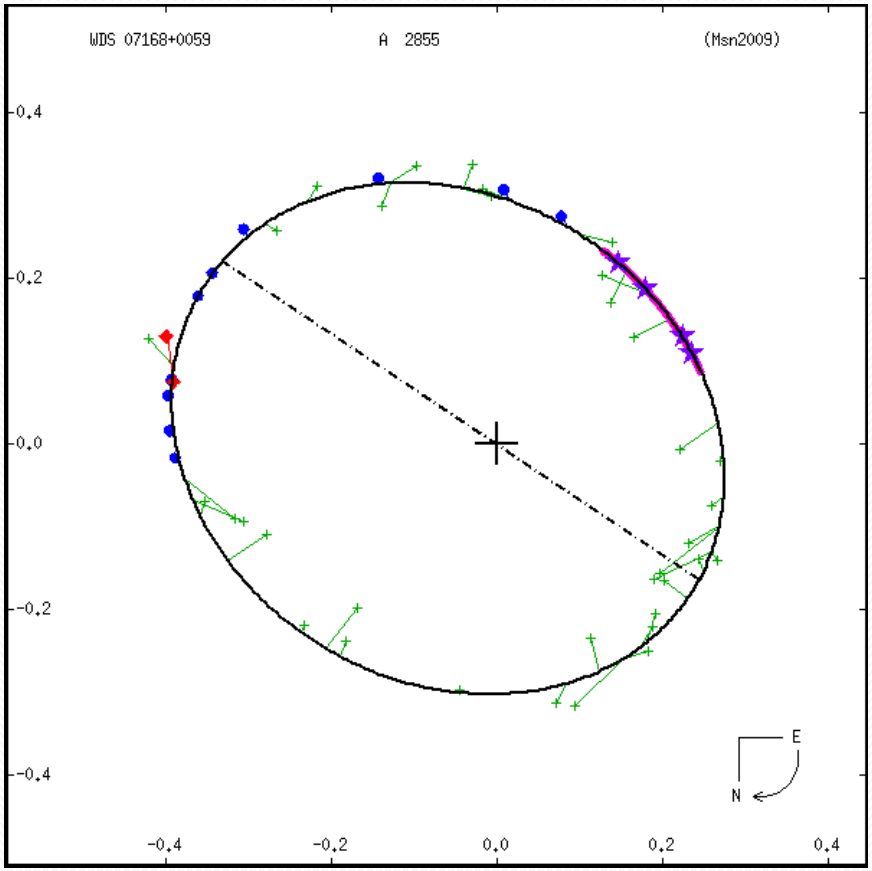


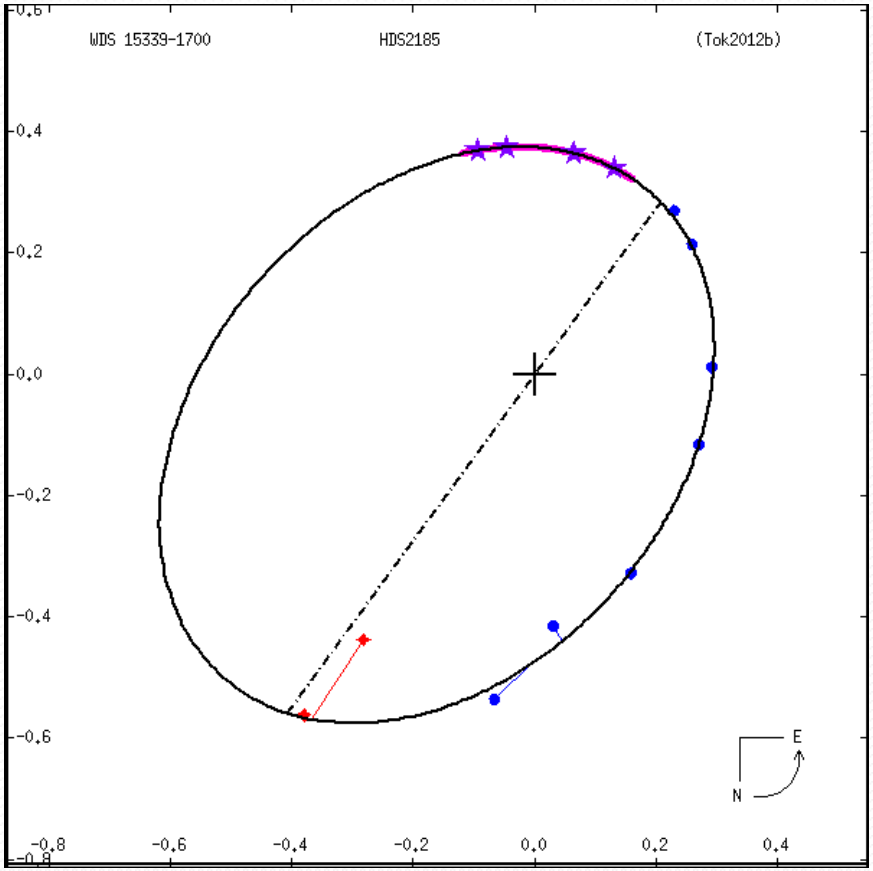
A 2855 (64.4y) HDS 2185 (60.0y)



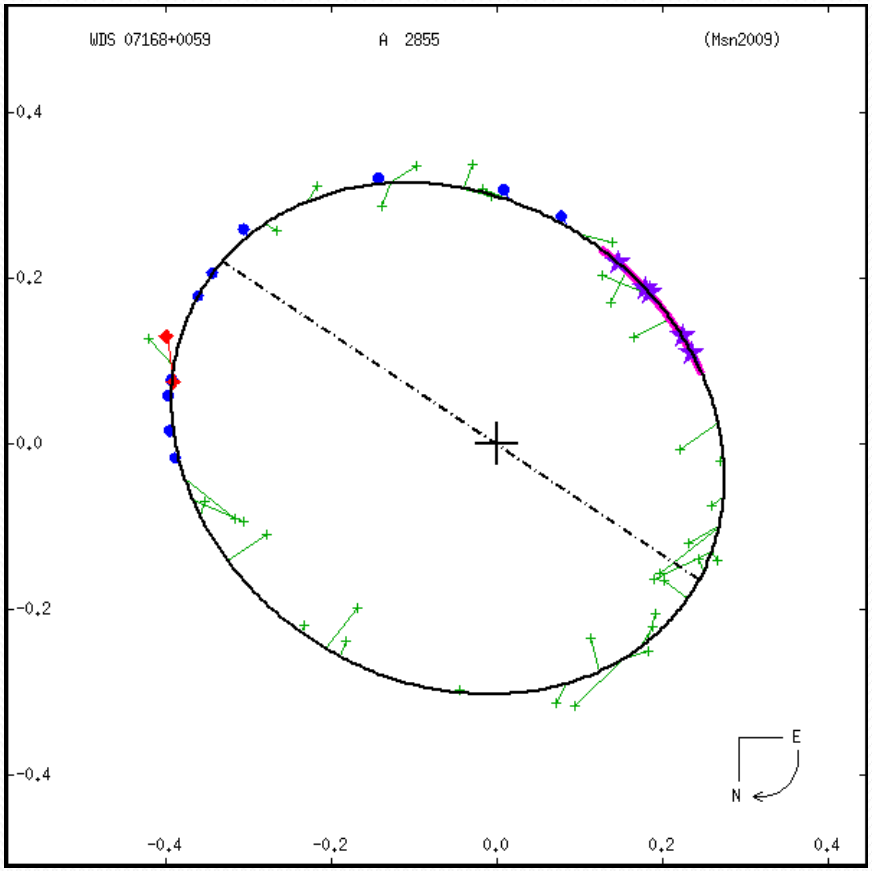


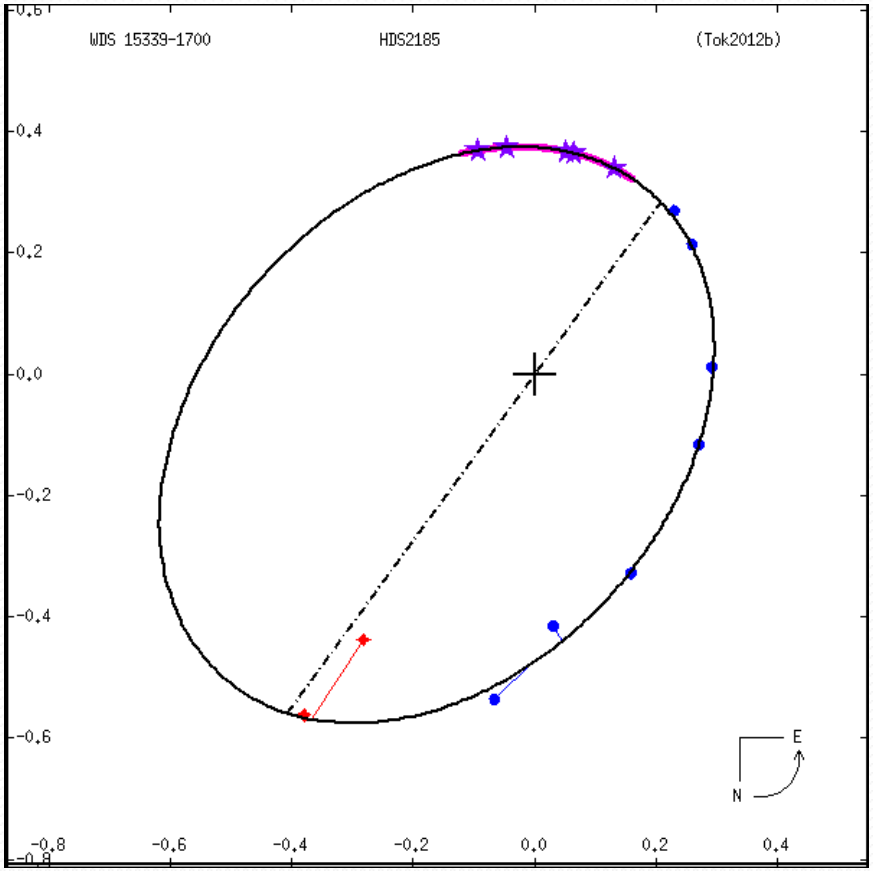
A 2855 (64.4y) HDS 2185 (60.0y)



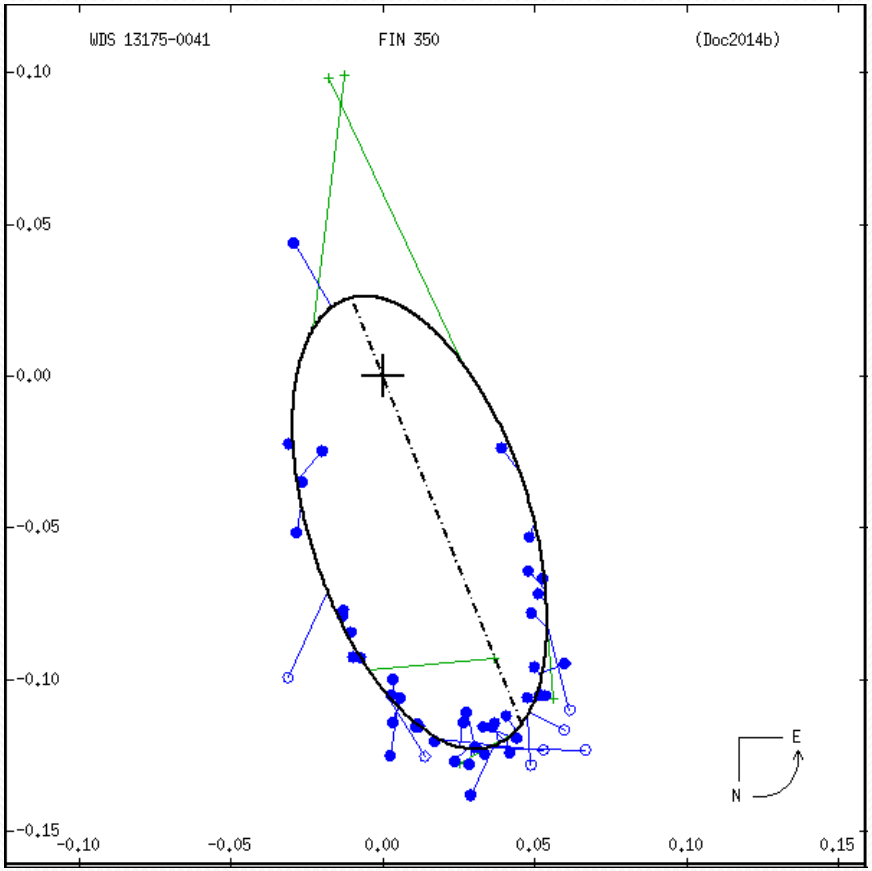


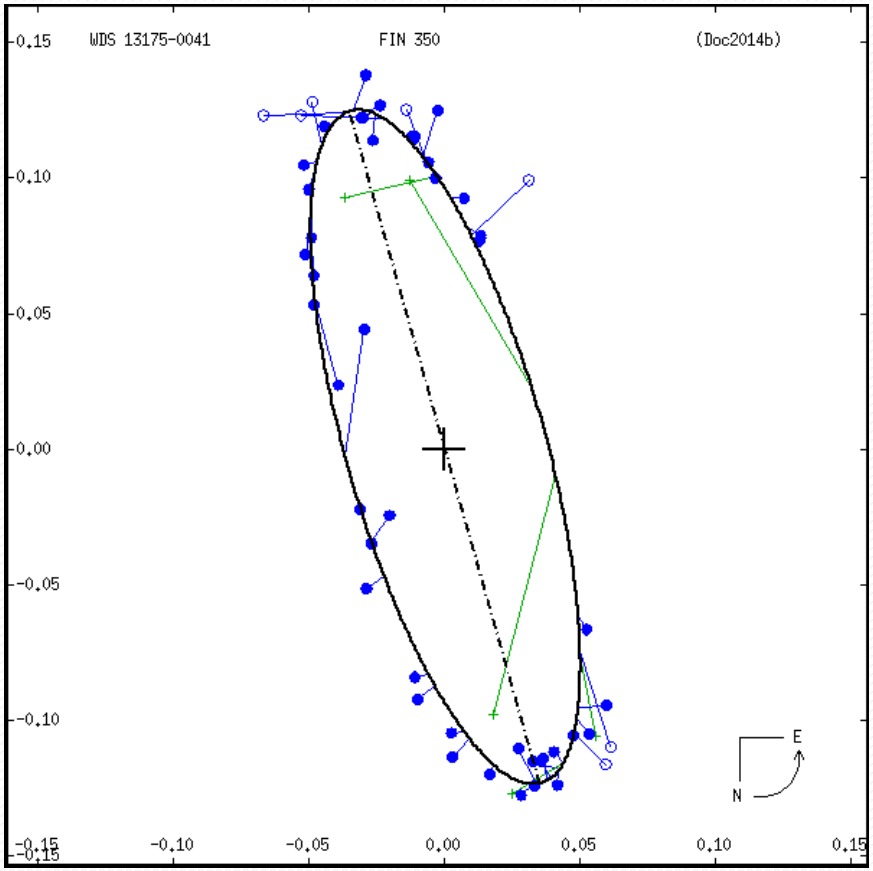
A 2855 (64.4y) HDS 2185 (60.0y)



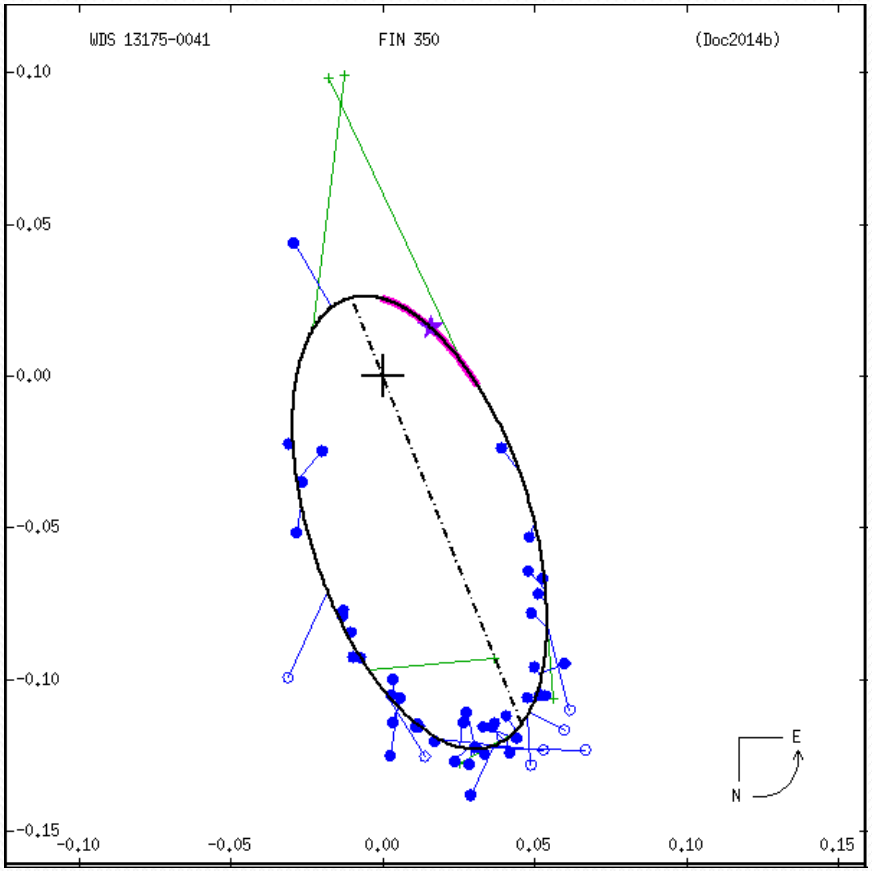


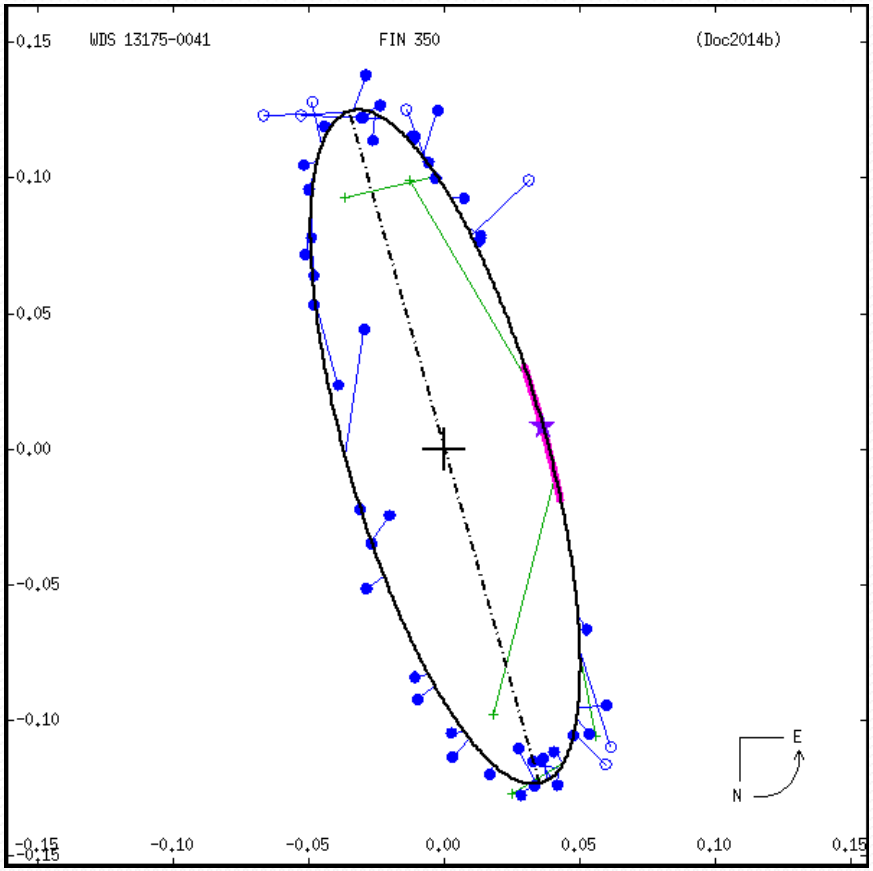
FIN 350 (9.1y) FIN 350 (18.4y)



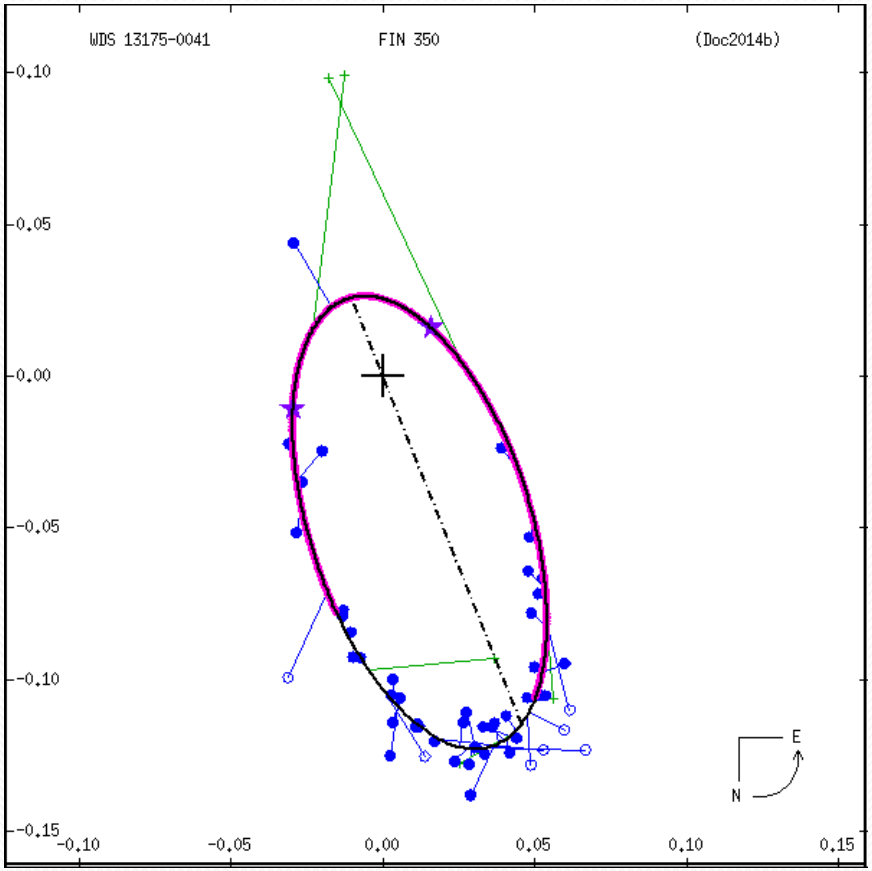


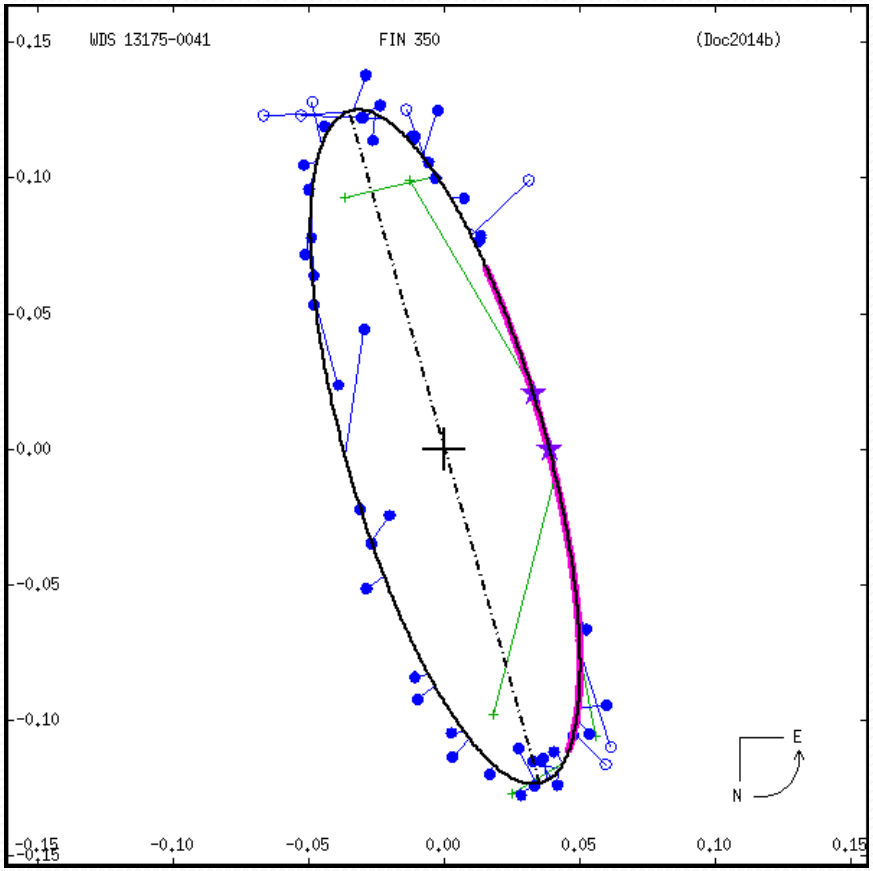
FIN 350 (9.1y) FIN 350 (18.4y)



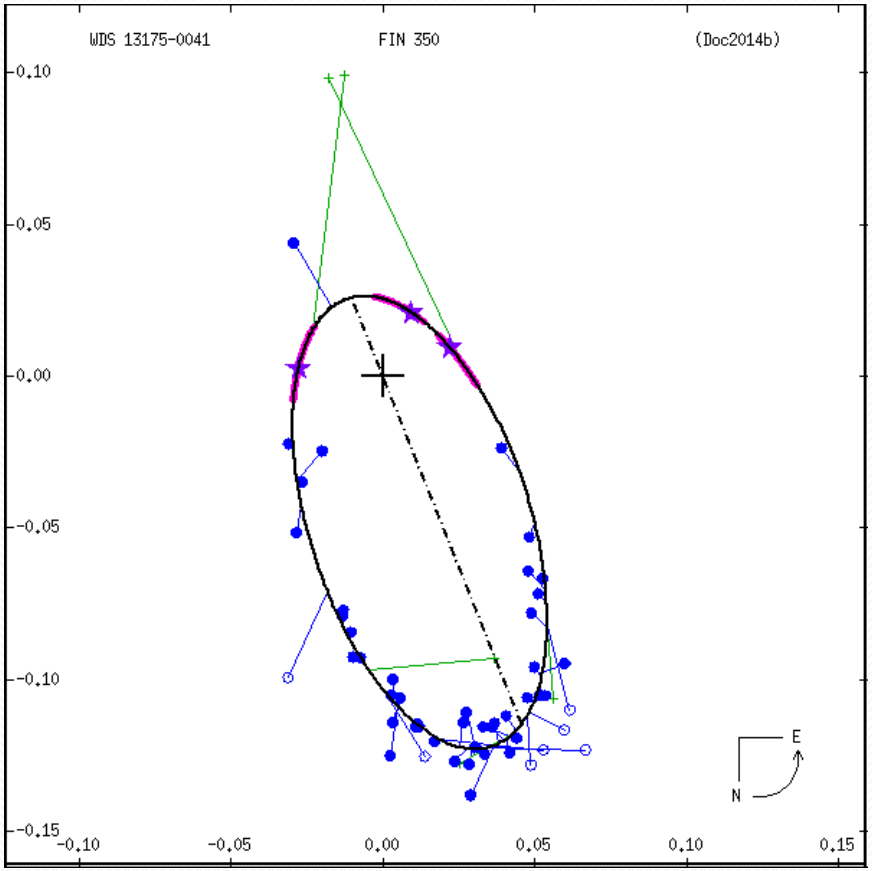


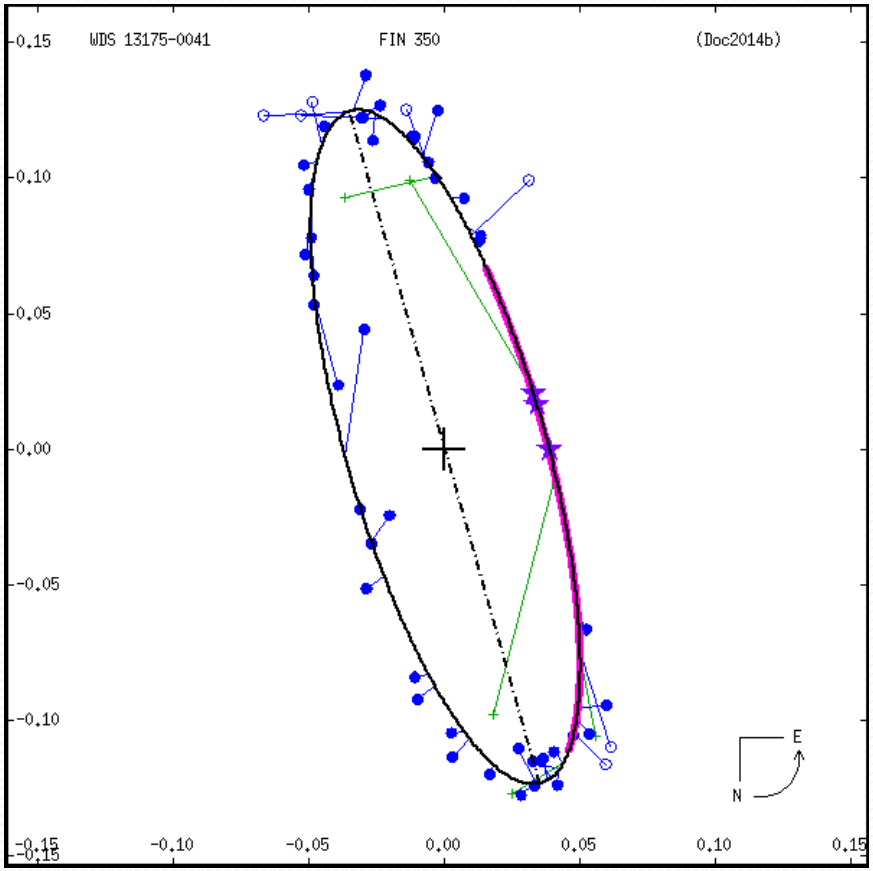
FIN 350 (9.1y) FIN 350 (18.4y)



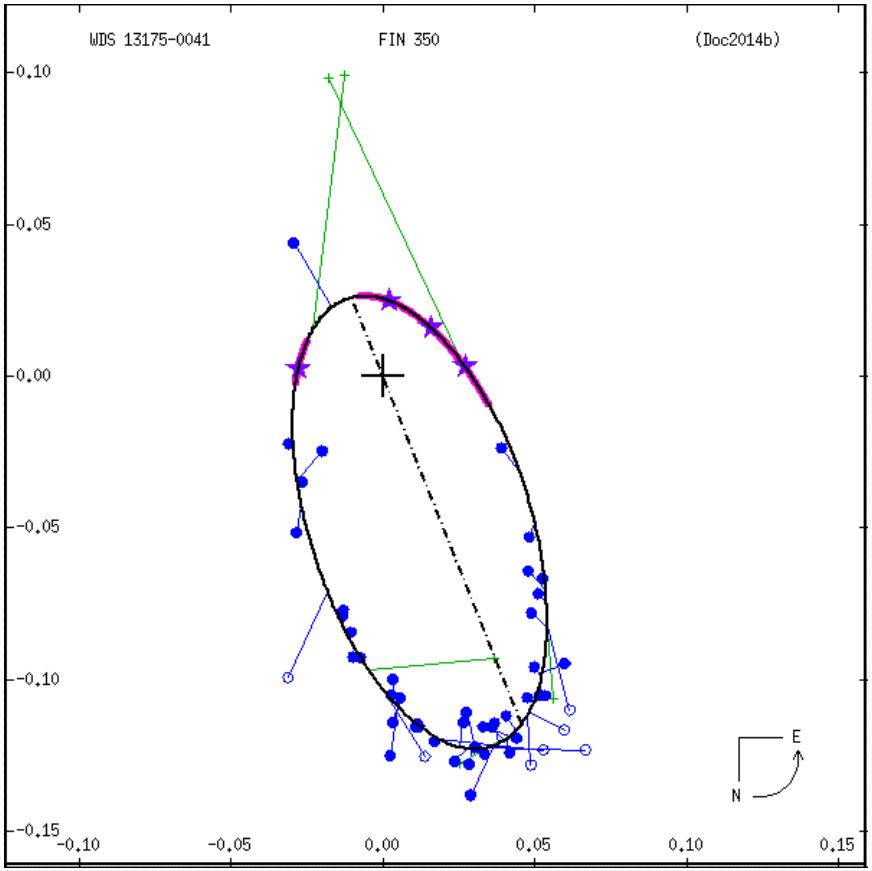


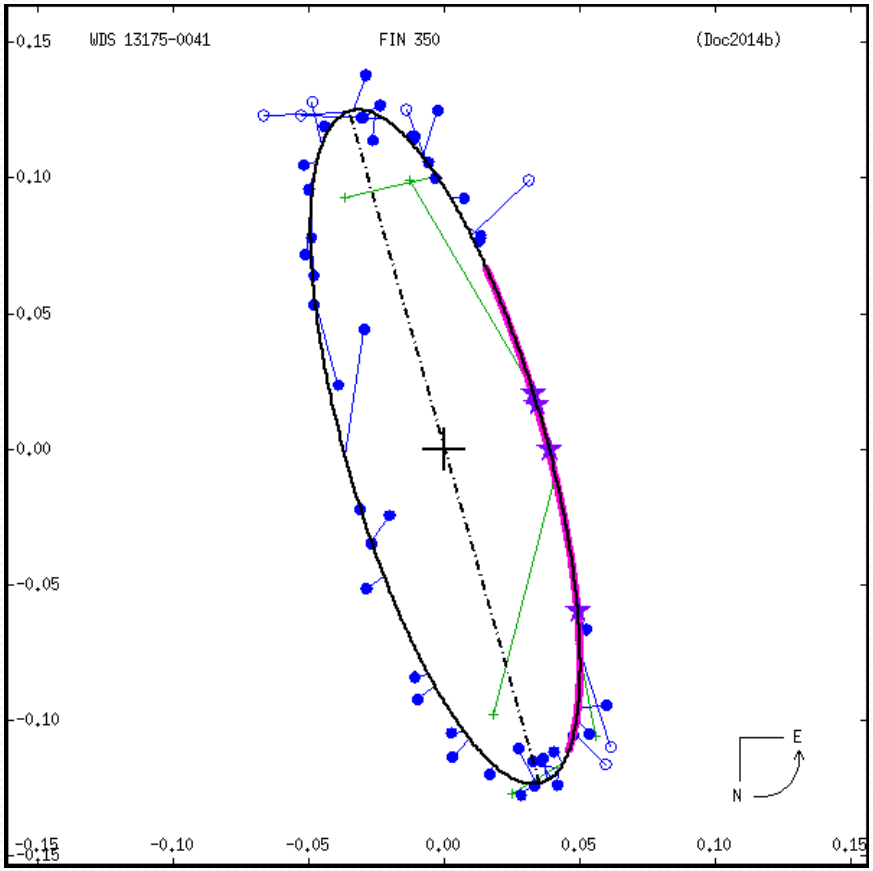
FIN 350 (9.1y) FIN 350 (18.4y)



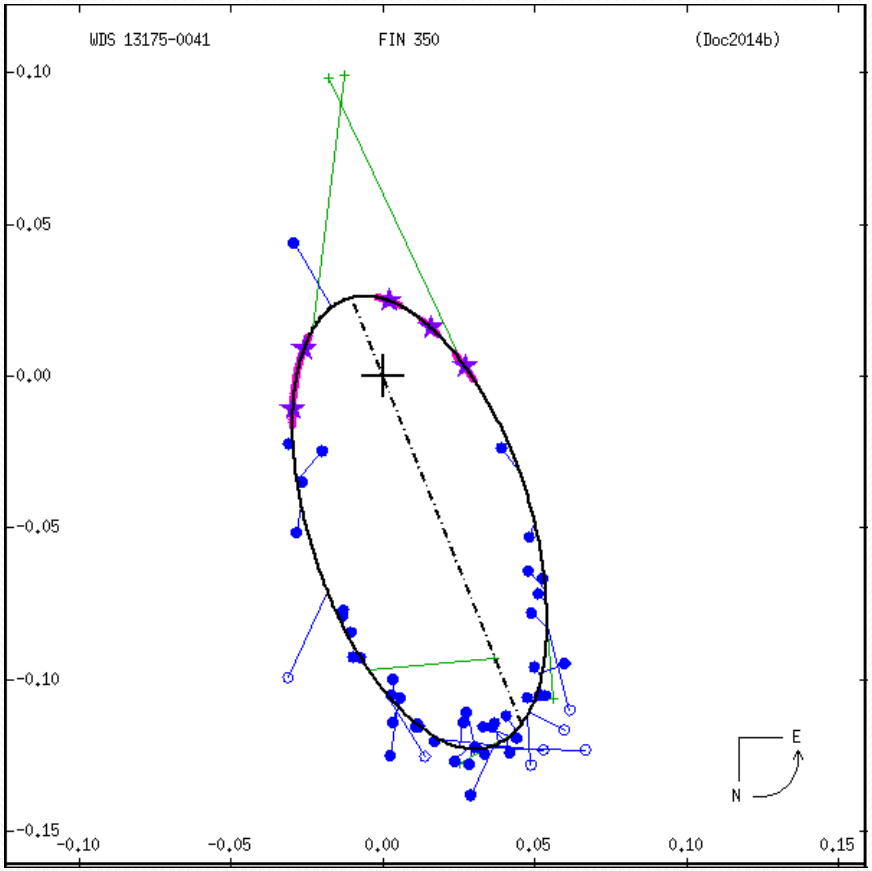


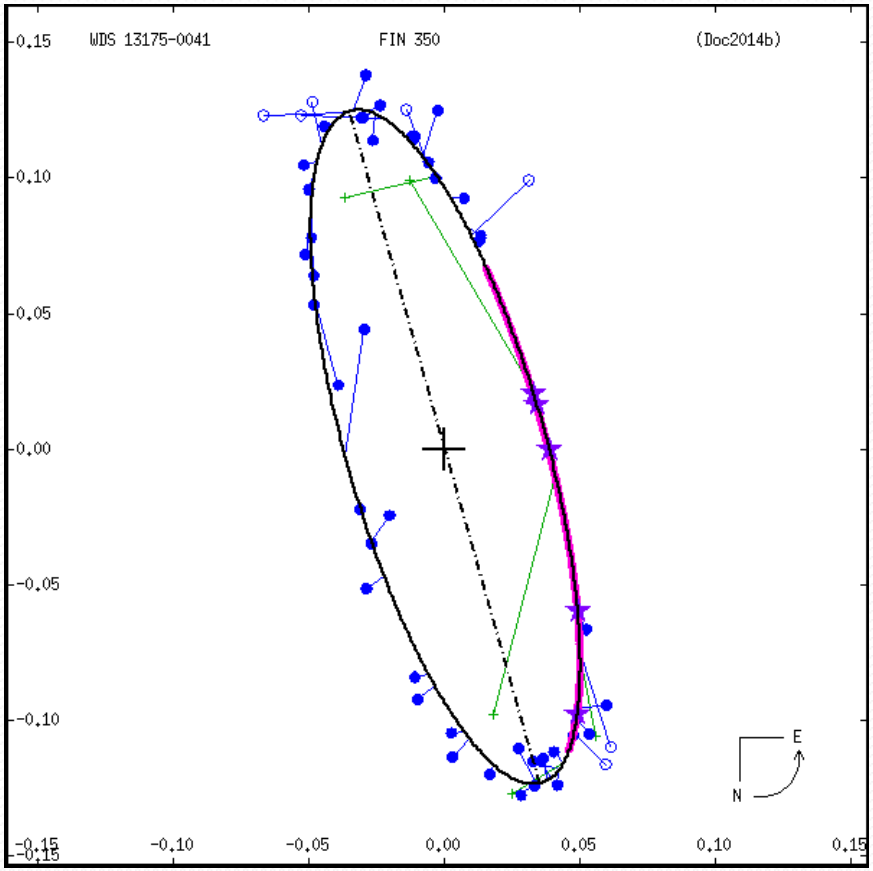
FIN 350 (9.1y) FIN 350 (18.4y)



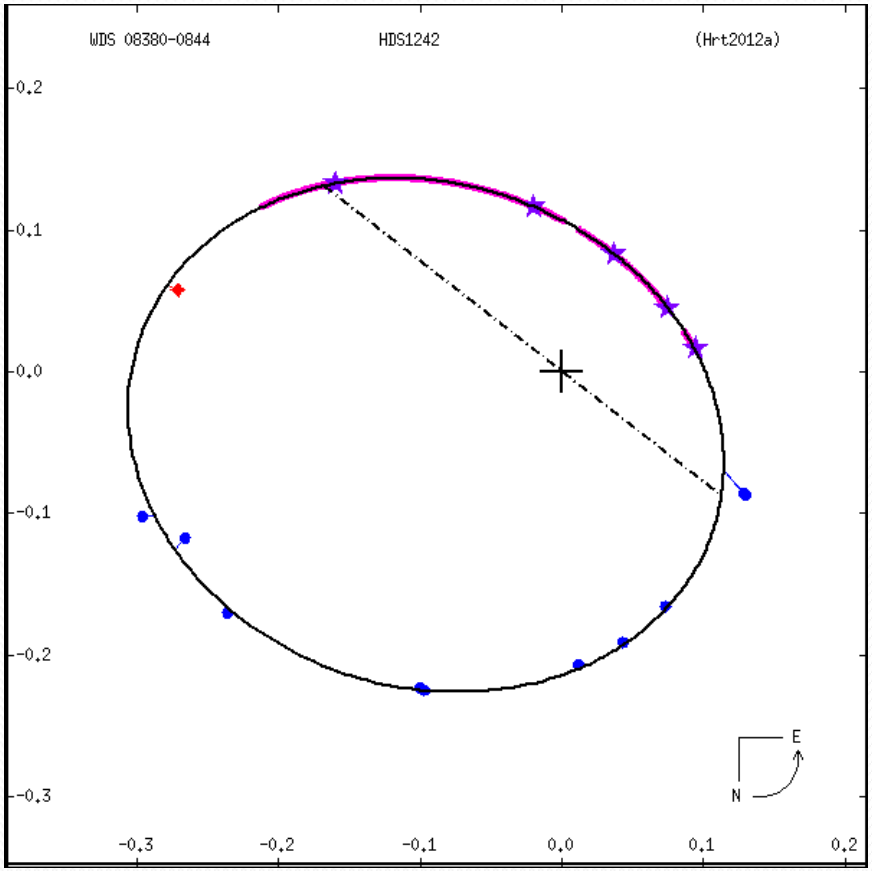


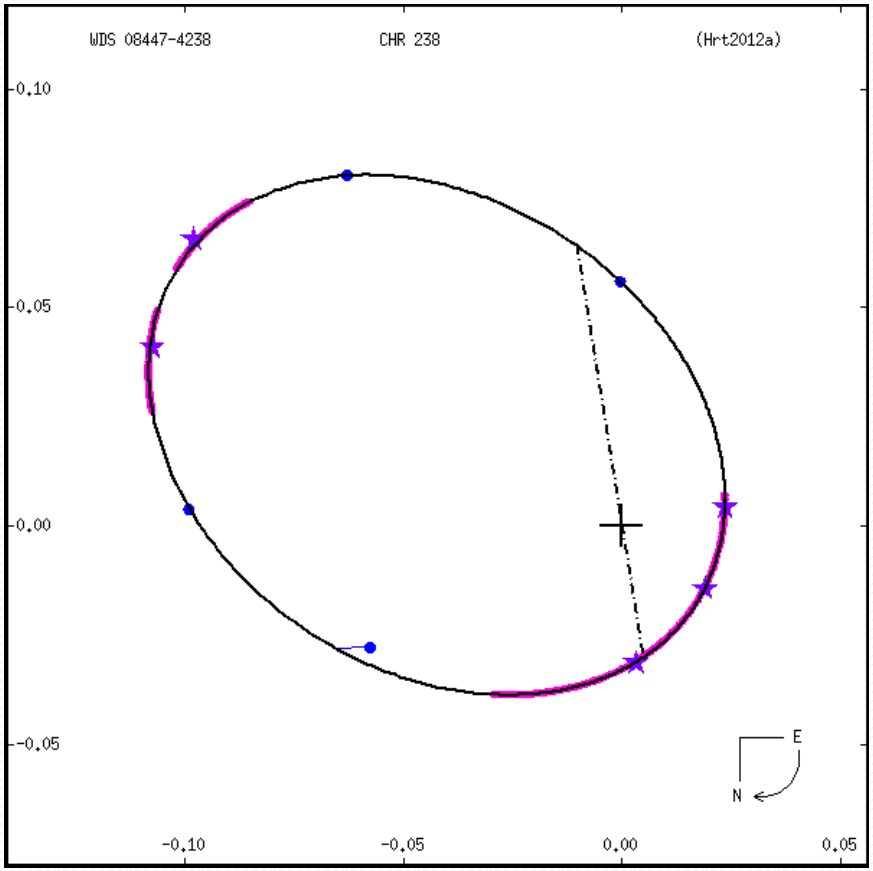
FIN 350 (9.1y) FIN 350 (18.4y)



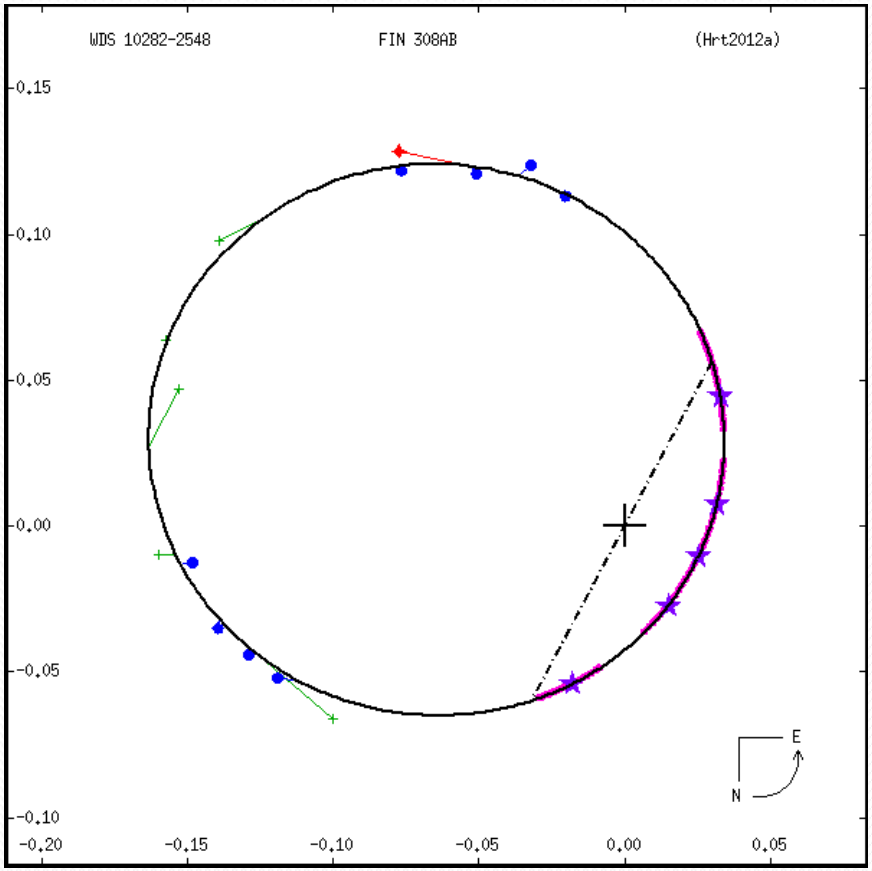


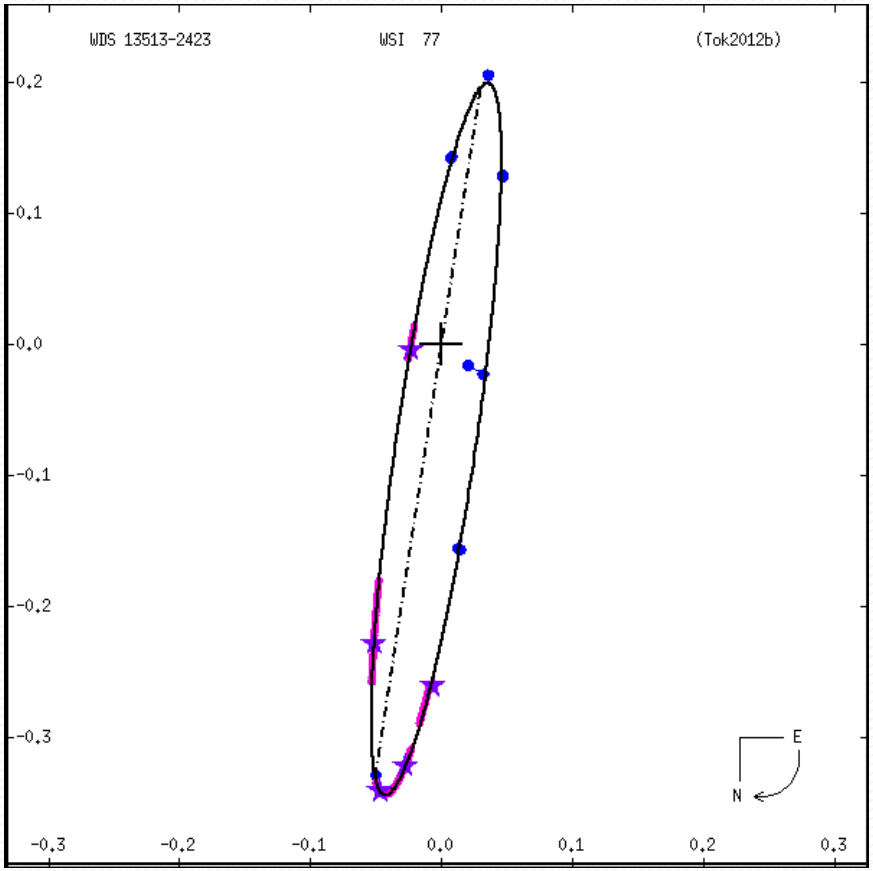
HDS 1242 (30.8y) CHR 238 (2.3y)



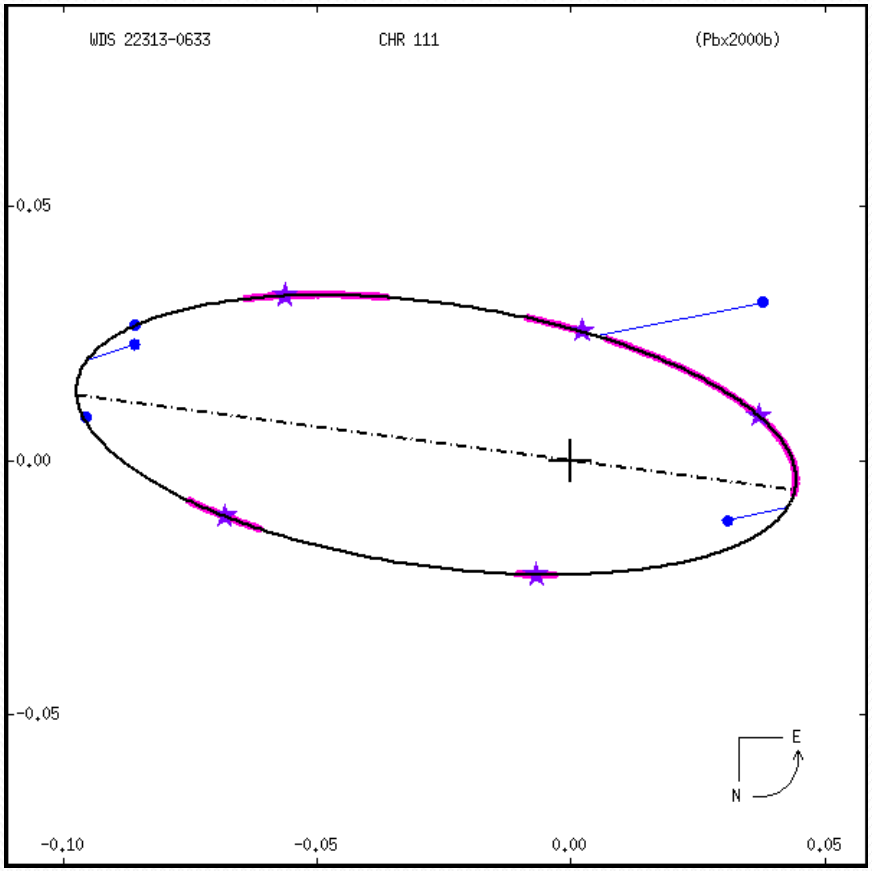


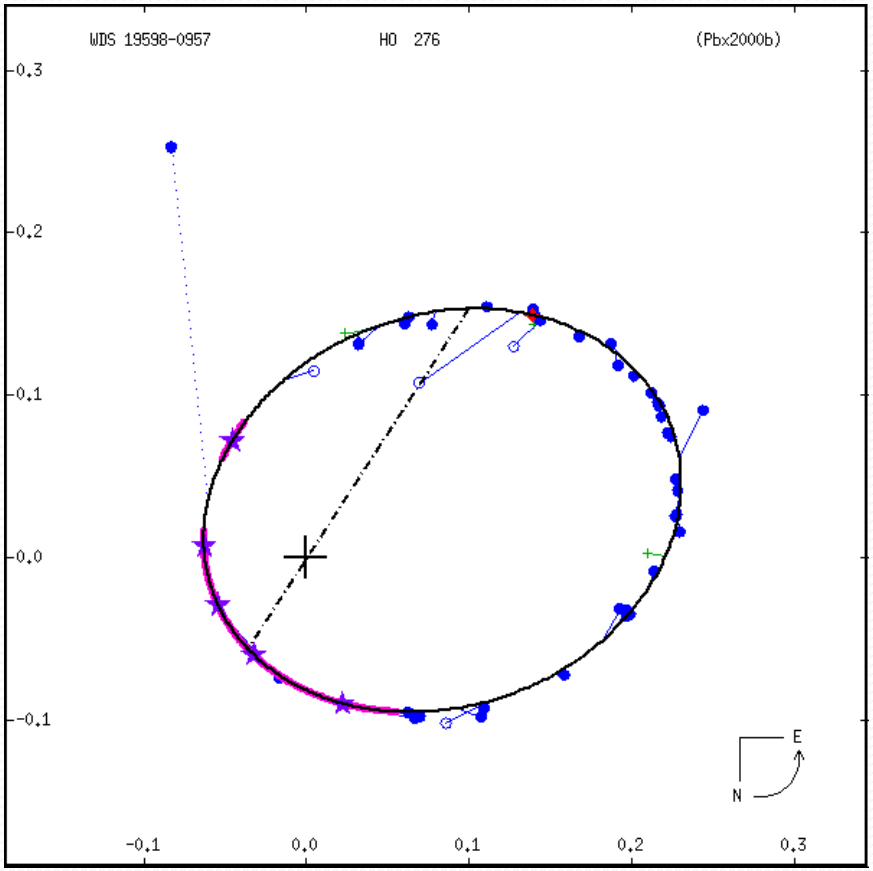
FIN 308 (32.8y) WSI 77 (10.5y)

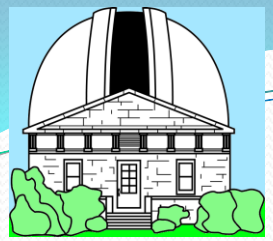




CHR 111 (1.7y) HO 276 (4.9y)







"Phase Optimizer"

- **Possible refinements**:
  - increase number of new measures only until grade improvement no longer significant.
  - Incorporate coordinates so optimum dates fall while pair actually observable!

- **Possible implementation**:
  - Determine set of "optimum" measurement dates for all orbit pairs
  - Add pairs to target list as they near best observing dates